

REMARKS

Review and reconsideration on the merits are requested.

Formalities

Applicants appreciate the Examiner:

Acknowledging a copy (there is one priority document) of the priority document having been received from the International Bureau;

Returning to PTOSB/08 forms, one filed September 7, 2004 and one filed November 29, (not 19), 2007.

Status of Claims

At the time of rejection, claims 1 and 2 were presented for examination and claims 3 and 4 were withdrawn.

The Prior Art

JP 2001-354,444 Kimura et al (Kimura); U.S. 6,107,235 Matsuzawa (Matsuzawa); U.S. 6,737,380 (for double patenting), and U.S. 6,737,380 Watanabe et al (Watanabe).

Rejection of Claim 1 as anticipated by Kimura

This rejection is avoided by including the limits of claim 1 and claim 2 plus additional limits into new claim 5.

Withdrawal is requested.

Rejection of Claim 2

Claim 2 is rejected under 35 U.S.C. §103(a) as being unpatentable over Kimura optionally in view of Matsuzawa.

The Examiner's position is set forth in the Action and will not be repeated here except as necessary to an understanding of Applicants' traversal which is now presented.

Traversal

(1) Characteristics of the Process for Producing a Catalyst:

The process for producing a catalyst according to the present invention comprises the basic steps of mixing Pt-supported sulfated zirconium hydroxide and pseudoboehmite, molding the mixture into the shape of a catalyst, calcining the molded form (at a temperature of 200°C to 800°C for 0.5 to 10 hours in an oxidizing atmosphere), supporting Pd thereon, and calcining the Pd-supported product (at a temperature of 100°C to 800°C for 0.5 to 10 hours in an oxidizing atmosphere).

It is only when the above steps including the order and conditions of those steps are met that a catalyst attaining the object of the invention can be obtained.

(2) Catalyst of Kimura:

The catalysts disclosed in Kimura are not the products of the process summarized above.

Kimura discloses 19 catalysts A to N and P to T as Examples including M and N sharing active metals, Pt and Pd, with the catalysts of the present invention. However, M and N are manufactured by the process comprising the steps of mixing a Pd salt solution and a Pt salt solution, impregnating sulfate-containing zirconium hydroxide with the mixed solution to have Pt and Pd simultaneously supported, mixing the intermediate with an alumina sol, forming the mixture into the shape of a catalyst and drying and calcining the catalyst (at 600°C for an unknown length of time in an unknown atmosphere). Kimura does not teach major steps of the process according to the present invention of calcining a support having Pt mixed therein and calcining a molded form (product) having Pd deposited on the support.

Quite clearly the inventors of Kimura did not think of repeating calcining twice, as claim 6 in Kimura merely discloses calcining at 550°C to 800°C for stabilization, and Kimura fails to disclose calcining after Pd deposition, not to speak of the conditions of such a repeated calcining.

Thus, the present invention is novel over the disclosure of Kimura, insofar as it specifies the calcining conditions for the molded form having Pt supported therein and for the catalyst having Pd supported thereon, which Kimura in no fashion suggests.

Moreover, the present invention is unobvious in view of Kimura, since claim 5 specifies as an essential feature the step of calcining a catalyst again after having Pd deposited thereon which makes it possible to achieve improved isomerization and desulfurization activity as specific results, as will now be explained.

(3) Comparison of Examples and Comparative Examples:

Catalyst J according to Comparative Example 4 in the present specification is equivalent to catalyst M of Kimura. Catalyst L according to Comparative Example 6 was manufactured by a process including supporting Pt, calcining, supporting Pd and calcining again, but the conditions do not fall within the scope of the present invention, as the final calcining temperature of 900°C does not fall within the range of 100°C to 800°C as claimed (see the amended claim above).

The process and conditions employed for the manufacture of those catalysts are compared in Table 1 below.

Table 1

Manufacturing process and conditions	The Present Application			Kimura
	Catalyst A (Example 1)	Catalyst J (Comparative Example 4)	Catalyst L (Comparative Example 6)	Catalyst M (Comparative Example 11)
Sulfating zirconium hydroxide and preparing a mixture containing Pt (Pt supported)	○	○	○	○
Molding	○	○	○	○
Calcining the molded form at 200-800°C for 0.5-10 hours	○	○ 600°C for 3 hr	○ 600°C for 3 hr	○ 600°C for ? hr (time is unknown)
Supporting Pd	○	X (*1)	○	X (*1)
Calcining a catalyst supporting Pd at 100-800°C for 0.5-10 hours	○	X	X 900°C (*2) for 3 hr	X

○: Done or satisfying; X: Not done or satisfying:

*1: Catalyst J of the present invention (Comp. Example) and catalyst M of Kimura had Pt and Pd supported simultaneously.

*2: The calcining temperature of 900°C does not fall within the scope of the invention.
The physical properties of those catalysts are compared in Table 2 below.

Table 2

	Catalyst A of the present invention (Example 1)	Catalyst J of the present invention (Comparative Example 4)	Catalyst M of Kimura (Comparative Example 11)
Pt content (weight %)	0.3	0.3	0.43
Pd content (weight %)	0.5	0.5	0.47
Specific surface area (m ² /g)	135	132	149
Pore volume (cc/g)	0.20	0.21	0.156
Sulfur content (weight %)	2.8	2.2	1.96
Crush strength (kg/mm)	0.9 (*3)	1.0 (*3)	0.6

*3: As calculated from the value expressed in kg/2 mm.

Table 3 compares catalysts A, J (equivalent to M of Kimura) and L in their hydrodesulfurization activity.

Table 3

		Catalyst A of the present invention (Example 1)	Catalyst J of the present invention (Comparative Example 4) = Catalyst M of Kimura (Comp. Ex. 11)	Catalyst L of the application (Comparative Example 6)
C ₅ isomer ratio (%)	20 hours	70	66	47
	150 hours	70	60	45
Sulfur content (weight ppm)	150 hours	0	3	9

(4) **Summary:**

In summary, the process of the present invention for producing a catalyst for hydrodesulfurization and isomerization is not disclosed in any fashion or suggested in any fashion in Kimura, and would be obvious to one of ordinary skill in the art only in retrospect based upon a reading of the present disclosure.

It is quite well accepted that the performance of a catalyst can be greatly affected by a small difference in the method for its manufacture. This is clear from the fact that catalyst L according to Comparative Example 6 in the present specification shows a serious reduction in performance due to the failure of its manufacturing process to satisfy one of the claimed requirements, i.e., the final calcining temperature fails to fall within the claimed range.

Kimura fails to disclose or suggest first calcining a support carrying Pt and then calcining it again after having Pd supported thereon, and is, therefore, unaware of the importance of the conditions for the final calcinations of the present claims, as already pointed out as above. No such prior art would have been expected to teach the features or advantages of the present invention, since it is, as a matter of fact, difficult to predict the performance of any catalyst manufactured by a process not specifically disclosed in the prior art. What Kimura teaches is limited to catalyst J according to Comparative Example 4 in the present application which is equivalent to catalyst M according to Example 11 of Kimura.

Applicants thus submit that the present claims are not anticipated nor rendered obvious by Kimura.

Claim 5 is not obvious over a combination of Kimura and Matsuzawa.

Matsuzawa discloses only a single metal deposition (supporting), either depositing on a molded support or addition at the time of kneading, and does not disclose or suggest production

conditions suitable for two times of deposition as used in the present invention (having Pt supported at the time of kneading, and then having Pd deposited on the support).

The Examples of Matsuzawa merely show Pt deposited on a support and do not show any deposition of Pd as employed in the present invention.

Further, while generically the catalyst of Kimura is used for the hydrodesulfurization of “unwashed light naphtha” as is the catalyst of the present invention, the catalyst of Matsuzawa is used for “the linear hydrocarbons of a petroleum cut having a boiling point of about -20°C to 110°C,” (see col. 7) and the Examples of Matsuzawa show n-hexane not contain any sulfur. Applicants submit that one of ordinary skill in the art would not be motivated to combine Matsuzawa with Kimura showing the use of the catalyst for oil containing an organic sulfur compound which is a poison to the catalyst, as stated in the present specification.

Withdrawal of any obviousness rejection over Kimura in view of Matsuzawa is respectfully requested.

Double Patenting:

Applicants respectfully submit that there is no reason for one of ordinary skill in the art to combine Matsuzawa and Watanabe and, as a consequence, the obviousness-type double patenting rejection is properly withdrawn.

Table 4 - Comparison of the New Claim of the Present Invention with the Processes of Matsuzawa and Watanabe.

Table 4

New claim of the present invention	Claim 2 of Matsuzawa	[Kneading] of Matsuzawa	Claim 4 of Watanabe
(1) Mixing Pt-supported SO ₄ /ZrO ₂ and alumina	Mixing SO ₄ , ZrO ₂ and alumina	Mixing metal component (*), SO ₄ , ZrO ₂ and alumina	Mixing SO ₄ /ZrO ₂ supporting a Group 8 metal, and alumina
(2) Molding	Shaping	Shaping	Shaping
(3) Calcining	Calcining	Calcining	Calcining
(4) Depositing Pd	Depositing a metal component (*)	-	-
(5) Calcining	Calcining	-	-

* A Group 8, 9 or 10 metal component (such as Pt, Pd, Ru or Ni).

Why claim 5 is not properly rejected on the grounds of obviousness-type double patenting in view of Matsuzawa and Watanabe.

Matsuzawa teaches at [Kneading] that a support (deposition) of a metal compound may be conducted by mixing during the kneading stage in the above-mentioned production method, whereby the intended solid acid catalyst can be obtained (see col. 5).

Accordingly, Matsuzawa shows that, even though supporting of the metal compound is conducted during kneading, only a catalyst which is comparable to a catalyst having a metal deposited on a support according to claim 2 of Matsuzawa can be obtained.

Catalyst I according to Comparative Example 3 of Watanabe is manufactured by the production method described at [Kneading] of Matsuzawa.

Accordingly, catalyst I of Watanabe is equal to the catalyst according to claim 2 of Matsuzawa.

Therefore, the combination of Matsuzawa and Watanabe results in a combination of the invention of Watanabe and the production method according to “Comparative Example” of Watanabe. Applicants do not consider that such combination would have been obvious to one skilled in the art, or that one skilled in the art would have been motivated to try such combination.

Further, Watanabe does not suggest supporting (depositing) Pd after molding and calcination.

Matsuzawa discloses a method of producing a catalyst having a metal component deposited on a support (claim 2) and a method of producing a catalyst having a metal component deposited in a support ([Kneading]), but does not suggest any combination of those methods.

Applicants respectfully submit that one of ordinary skill in the art would be led to combine Matsuzawa and Watanabe only upon a reading of the present specification and, for that reason, the obviousness-type double patenting rejection must fall.

Finally, the present invention specifies the order in which the metals are supported, so that Pt may first be contained in a support, followed by the deposition of Pd on the support. However, the Examples of Matsuzawa merely show the deposition of Pt on a support, while the Examples of Watanabe show supporting Pd, or Pd and Pt in a support, and the combination of Matsuzawa and Watanabe does not teach the order in which the metals are supported according to the present invention.

Withdrawal of all rejections and allowance is requested.

Basis for Claim Amendments

Most of the limits occur in claim 1 and claim 2 as filed.

For the calcining of step (3), see page 13, lines 1-4.

AMENDMENT UNDER 37 C.F.R. §1.111
Application No. 10/506,802

For the calcining of step (5), see page 15, lines 1-6.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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